

Claims

What is claimed is:

1) A method for providing a sustained release of a dose of a pharmaceutical agent, comprising the steps of:

a) providing a member selected from a suture, a staple, a dental implant, clip or a member including a lumen; and

b) applying to the implant a sustained release medium and a pharmaceutical agent selected from an antimicrobial, an antithrombotic, an antiseptic, an antifungal, a chelating, an anticoagulant, antibiotic, an anti-inflammatory, a steroid, an antiglaucomatous or a combination thereof.

2) The method of claim 1, wherein the sustained release medium and the pharmaceutical layer is applied for defining a multi-layered structure, a structure having the pharmaceutical agent dispersed in the sustained release medium or a combination thereof;

wherein the sustained release medium is applied to optionally define a barrier layer over at least one region of a pharmaceutical agent;

wherein the sustained release medium comprises a material provided in a state selected from solid, semi-solid, liquid, gel, amorphous solid, crystalline solid, freeze dried, spray-dried, or supercooled;

wherein over a major portion of its length, the outer surface of the member has the sustained release medium and the pharmaceutical agent applied thereto, and is selected from a smooth surface an irregular surface, a stepped surface, a tapered surface, a surface having no slope or a combination thereof;

wherein at least one of the sustained release medium, the pharmaceutical agent, or a combination of both, is applied to the implant by a step including, spraying, dipping, swabbing, brushing, rolling, curtain coating, doctor blading, vapor deposition or combinations thereof;

wherein the pharmaceutical agent is applied to the member along the length of the implant as a continuous layer or an intermittent layer;

wherein the pharmaceutical agent is optionally applied to the member by producing a mixture that includes at least one porogenic agent, compacting or shaping the mixture to its desired form, treating the product obtained in such a way that the porogen is removed, and introducing pharmaceutical agent where the porogen used to be; and

wherein the pharmaceutical agent is applied to the member at a surgical site with a dispensing device for applying the pharmaceutical agent with the sustained release medium or at a site remote from the surgical site.

- 3) An implantable device having a pharmaceutical agent adapted for sustained release therein, comprising:
  - a) an elongated hollow member having a plurality of openings formed along its length;
  - b) a pharmaceutical agent disposed within the hollow member; selected from an antimicrobial, an antithrombotic, an antiseptic, an antifungal, a chelating, an anticoagulant, antibiotic, an anti-inflammatory, a steroid, an antiglaucomatous or a combination thereof; and
  - c) a layer including a sustained release medium that diminishes in size over time when implanted in a body for exposing the openings and releasing the pharmaceutical agent.
- 4) The device of claim 3, wherein the openings vary in size or shape along the length of the member.
- 5) The device of claim 3 wherein the sustained release medium comprises a material provided in a state selected from solid, semi-solid, liquid, gel, amorphous solid, crystalline solid, freeze dried, spray-dried, or supercooled,

- 6) The device of claim 3, wherein over a major portion of its length, the outer surface of the member has the sustained release medium and the pharmaceutical agent applied thereto, and is selected from a smooth surface an irregular surface, a stepped surface, a tapered surface, a surface having no slope or a combination thereof.
- 7) The device of claim 5, wherein over a major portion of its length, the outer surface of the member has the sustained release medium and the pharmaceutical agent applied thereto, and is selected from a smooth surface an irregular surface, a stepped surface, a tapered surface, a surface having no slope or a combination thereof.
- 8) The device of claim 3, further comprising a detectable marker.
- 9) The device of claim 6, further comprising a detectable marker.
- 10) The device of claim 7, wherein the sustained release medium is selected from caprolactones (e.g., a polyactide-coglycolide-co-caprolactone (PGLC) polymer), multivesicular liposomes (e.g., with unilamellar vesicles, multilamellar vesicles, neosomes, closely packed non-concentric vesicles (such as DEPOFOAM™), or combinations thereof), salts (e.g., an ammonium salt of 1-0- hexadecylpropanediol-3-phosphoganciclovir (HDP-P-GCV)), poly(lactic acid), poly (glycolic acid), copolymers of lactic and glycolic acids, poly (DL-lactide-co-glycolide) (PLGA) or blends of PLGA of different molecular weights, poly (orthoester), acrylic polymers, methacrylic polymers, poly (hydroxyethylmethacrylate), polysulfone or mixtures thereof.
- 11) An implantable device, comprising:

- a) an implantable elongated hollow member including a lumen;
  - b) a sustained release medium within the interior of the lumen for changing dimensions over time as matter is passed through the lumen.
- 12) The device of claim 11, wherein the elongated hollow includes a lumen section shaped as a rectangle, a circle, or a triangle.
- 13) The device of claim 11, wherein the lumen has a rectangular section and the sustained release medium is adapted to increase a rate of flow through the lumen linearly over time.
- 14) The device of claim 11, wherein the lumen has a circular section and the sustained release medium is adapted to increase a rate of flow through the lumen over time followed by a period of slower increase of flow rate.
- 15) The device of claim 11, wherein the lumen has a triangular section and the sustained release medium is adapted so that the rate of increase of flow gradually decreases.
- 16) The device of claim 11, wherein the lumen has a triangular section and the sustained release medium is adapted so that the rate of increase of flow gradually increases.
- 17) The device of claim 11 wherein the member has a fixed inner and outer dimension, the member includes a plurality of openings of a fixed size and shape, and the sustained release medium comprises a material provided in a state selected from solid, semi-solid, liquid, gel, amorphous solid, crystalline solid, freeze dried, spray-dried, or supercooled.

- 18) The device of claim 17 further comprising a pharmaceutical agent combined with the sustained release medium selected from an antimicrobial, an antithrombotic, an antiseptic, an antifungal, a chelating, an anticoagulant, antibiotic, an anti-inflammatory, a steroid, an antiglaucomatous or a combination thereof.
- 19) The device of claim 17 wherein the sustained release medium is selected from caprolactones (e.g., a polyactide-coglycolide-co-caprolactone (PGLC) polymer), multivesicular liposomes (e.g., with unilamellar vesicles, multilamellar vesicles, neosomes, closely packed non-concentric vesicles (such as DEPOFOAM<sup>TM</sup>), or combinations thereof), salts (e.g., an ammonium salt of 1-0- hexadecylpropanediol-3-phosphoganciclovir (HDP-P-GCV)), poly(lactic acid), poly (glycolic acid), copolymers of lactic and glycolic acids, poly (DL-lactide-coglycolide) (PLGA) or blends of PLGA of different molecular weights, poly (orthoester), acrylic polymers, methacrylic polymers, poly (hydroxyethylmethacrylate), polysulfone or mixtures thereof.
- 20) The device of claim 18 wherein the sustained release medium is selected from caprolactones (e.g., a polyactide-coglycolide-co-caprolactone (PGLC) polymer), multivesicular liposomes (e.g., with unilamellar vesicles, multilamellar vesicles, neosomes, closely packed non-concentric vesicles (such as DEPOFOAM<sup>TM</sup>), or combinations thereof), salts (e.g., an ammonium salt of 1-0- hexadecylpropanediol-3-phosphoganciclovir (HDP-P-GCV)), poly(lactic acid), poly (glycolic acid), copolymers of lactic and glycolic acids, poly (DL-lactide-coglycolide) (PLGA) or blends of PLGA of different molecular weights, poly (orthoester), acrylic polymers, methacrylic

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polymers, poly (hydroxyethylmethacrylate), polysulfone or mixtures thereof.